Docket No. 50277-1561 (UID 2000-068-01)

Patent

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

David LONG, *et al.*

Serial No.: 09/853,823

Filed: May 11, 2001

Title: NESTED TRANSACTIONS IN A FILE SYSTEM

Confirmation No.: 6447

Group Art Unit: 2195

Examiner: Syed J. ALI

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Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

REPLY TO FINAL OFFICE ACTION

Sir:

This communication is in response to the Office Action mailed April 6, 2005, the

shortened statutory period for which runs until July 6, 2005. The Applicants respectfully request

reconsideration of the application in light of the amendments and remarks herein.

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 8 of this paper.

AMENDMENTS TO THE CLAIMS

1. 1. (Currently Amended) A method for performing operations in an electronic file system,

   the method comprising the steps of:

   receiving a command to perform one or more file system operations;

   in response to said command, performing a plurality of operations including said one

   or more file system operations;

   wherein the step of performing the plurality of operations includes:

   performing a first subset of said plurality of operations as part of a first

   transaction; and

   performing a second subset of said plurality of operations as part of a second

   transaction that is nested in said first transaction,

   wherein each of said one or more file system operations is included in at least

   one of the first subset of said plurality of operations and the second

   subset of said plurality of operations.

2. 2. (Original) The method of Claim 1 wherein the step of performing the

   plurality of operations further includes the step of performing a third

   subset of said plurality of operations as part of a third transaction that is

   nested in said second transaction.

3. 3. (Original) The method of Claim 1 wherein the second subset of operations are

   operations that are triggered by an operation that belongs to said first subset of

   operations.

4. 4. (Original) The method of Claim 1 wherein:

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2   the step of receiving the command is performed by an entity that resides external to a

3   database server; and

4   the step of performing said plurality of operations includes said entity sending

5   database commands to said database server.

1   5.   (Original) The method of Claim 4 wherein the step of performing said second subset

2   includes:

3   the entity sending to the database server a savepoint command for the database server

4   to establish a savepoint; and

5.   after the entity sends to the database server a savepoint command, the entity sending

6   to the database server commands for performing said second subset of said

7   plurality of operations.

1   6.   (Original) The method of Claim 5 further comprising the entity responding to a failure

2   of an operation in said second subset by sending to the database server a command to

3   roll back to said savepoint.

1   7.   (Original) The method of Claim 4 further comprising the entity maintaining a

2   transaction list by performing the steps of:

3   adding an entry to the tail of the transaction list when the entity sends a savepoint

4   command to the database server to start a nested transaction; and

5   when an operation fails, determining the savepoint to roll back to based on the entry

6   at the tail of the transaction list; and

7   removing the entry from the tail of the transaction list when the nested transaction

8   fails or completes successfully.

1   8.   (Original) The method of Claim 3 wherein:

2   the one or more file system operations include an operation on a folder; and

3   the second subset of operations includes operations associated with one or more

4   documents within the folder.

1   9.   (Original) The method of Claim 4 further comprising the steps of:

2   the entity determining whether all operations that are to be performed as a nested

3   transaction are read only;

4   if all operations that are to be performed as the nested transaction are read only, then

5   sending commands to perform the operations without first sending a command

6   to establish a savepoint; and

7   if all operations that are to be performed as the nested transaction are not read only,

8   then sending a command to establish a savepoint prior to sending commands

9   to perform the operations.

1   10.   (Currently Amended) A computer-readable medium carrying instructions for

2   performing operations in an electronic file system, the computer-readable medium

3   comprising instructions for performing the steps of:

4   receiving a command to perform one or more file system operations;

5   in response to said command, performing a plurality of operations including said one

6   or more file system operations;

7   wherein the step of performing the plurality of operations includes:

8   performing a first subset of said plurality of operations as part of a first

9   transaction; and

4

10   performing a second subset of said plurality of operations as part of a second

11   transaction that is nested in said first transaction,

12   <u>wherein each of said one or more file system operations is included in at least</u>

13   <u>one of the first subset of said plurality of operations and the second</u>

14   <u>subset of said plurality of operations.</u>

1   11.   (Original) The computer-readable medium of Claim 10 wherein the step

2   of performing the plurality of operations further includes the step of

3   performing a third subset of said plurality of operations as part of a third

4   transaction that is nested in said second transaction.

1   12.   (Original) The computer-readable medium of Claim 10 wherein the second subset of

2   operations are operations that are triggered by an operation that belongs to said first

3   subset of operations.

1   13.   (Original) The computer-readable medium of Claim 10 wherein:

2   the step of receiving the command is performed by an entity that resides external to a

3   database server; and

4   the step of performing said plurality of operations includes said entity sending

5   database commands to said database server.

1   14.   (Original) The computer-readable medium of Claim 13 wherein the step of

2   performing said second subset includes:

3   the entity sending to the database server a savepoint command for the database server

4   to establish a savepoint; and

5

5   after the entity sends to the database server a savepoint command, the entity sending

6   to the database server commands for performing said second subset of said

7   plurality of operations.

1   15.   (Original) The computer-readable medium of Claim 14 wherein the entity responds to

2   a failure of an operation in said second subset by sending to the database server a

3   command to roll back to said savepoint.

1   16.   (Original) The computer-readable medium of Claim 13 further comprising

2   instructions for causing the entity to maintain a transaction list by performing the

3   steps of:

4   adding an entry to the tail of the transaction list when the entity sends a savepoint

5   command to the database server to start a nested transaction; and

6   when an operation fails, determining the savepoint to roll back to based on the entry

7   at the tail of the transaction list; and

8   removing the entry from the tail of the transaction list when the nested transaction

9   fails or completes successfully.

1   17.   (Original) The computer-readable medium of Claim 12 wherein:

2   the one or more file system operations include an operation on a folder; and

3   the second subset of operations includes operations associated with one or more

4   documents within the folder.

1   18.   (Original) The computer-readable medium of Claim 13 further comprising

2   instructions for performing the steps of:

3   the entity determining whether all operations that are to be performed as a nested

4   transaction are read only;

5   if all operations that are to be performed as the nested transaction are read only, then

6   sending commands to perform the operations without first sending a command

7   to establish a savepoint; and

8   if all operations that are to be performed as the nested transaction are not read only,

9   then sending a command to establish a savepoint prior to sending commands

10   to perform the operations.

REMARKS

The Examiner is thanked for the performance of a thorough search.

Claims 1 and 10 have been amended.

No claims have been added or cancelled. Hence, Claims 1-18 are pending in the application.

I.   SUMMARY OF THE REJECTIONS

Claims 1-18 have been rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by Rich et al., U.S. Patent No. 6,457,065 ("RICH").

II.   REJECTIONS BASED ON THE CITED ART

A.   CLAIMS 1 AND 10

Claims 1 and 10 recite the following features:

> **receiving a command to perform one or more file system operations;**
> in response to said command, performing **a plurality of operations including**
>   **said one or more file system operations;**
> wherein the step of performing the plurality of operations includes:
>   performing **a first subset of said plurality of operations as part of a**
>   **first transaction; and**
>   performing **a second subset of said plurality of operations as part of a**
>   **second transaction that is nested in said first transaction,**
>   **wherein each of said one or more file system operations is included in at**
>   **least one of the first subset of said plurality of operations and the**
>   **second subset of said plurality of operations.**

The Applicants respectfully submit that these features are not disclosed, taught, or suggested by RICH.

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1.   <u>RICH does not describe, either explicitly or implicitly, that one or more</u>

<u>file system operations are performed as part of nested transactions</u>

a.   <u>RICH does not describe the performance of file system operations</u>

The Office Action asserts that RICH expressly describes that files system operations are

supported. Specifically, in page 6, numbered paragraph 16, the Office Action states:

> Rich discusses a transactional approach to performing operations upon data,
> particularly data in a database or persistent storage. Furthermore, Rich explicitly
> states that file system operations are supported (col. 21 lines 51-55, "Any type of
> persistent store, however organized [such as a file system], may be used").

The Applicants respectfully disagree with the assertion that in col. 21, lines 51-55 RICH

"explicitly states that file system operations are supported." In fact, the term "file system

operation" is not even mentioned, used, or recited anywhere in RICH.

In col. 21, lines 51-55, RICH states:

> The discussions of **persistent store** herein are in terms of using a "database".
> However, it is to be understood that this is for ease of reference. **Any type of
> persistent store, however organized (such as a file system), may be used
> without deviating from the inventive concepts disclosed herein.** (Emphasis
> added)

Thus, RICH does NOT explicitly state that file system operations are supported. What the

above paragraph teaches is that any type of persistent store, however organized (e.g., as a file

system), may be used without deviating from the inventive concepts disclosed in RICH.

When taken in the context of the disclosure in RICH, the above paragraph teaches that

any type of persistent store, however organized, **may be used without deviating from the**

inventive concepts disclosed in RICH. This is significant, because the invention in RICH

"defines a **remote object replication technique** that eliminates the need to transfer high

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numbers of messages for object access across a network." (RICH, col. 7, lines 33-35, emphasis

added). Moreover, RICH teaches that the term "object" carries its ordinary meaning as

understood in the art, which is an instantiated object-oriented class that encapsulates object

attributes that carry data with methods that operate on the object attributes. (See col. 1, line 60

to col. 2, line 8.) Nothing in RICH describes, teaches or suggests that the term "object" is used

to mean anything but this ordinary meaning, let alone suggest that somehow "object" is used to

describe an element of a file system, such as, for example, a file or a folder.

Furthermore, the persistent store in RICH is a persistent store of OBJECTS. (See col. 3,

line 20-21; col. 3, line 46; col. 8, lines 12-13). With respect to the persistent store, RICH states

in col. 8, lines 10-15 that

> The concept of a persistent store is well known, and will not be described in
> detail herein. In a client/server or multi-tiered environment, **a persistent store of
> objects may be maintained in one or more locations which are accessible by
> applications in the computing environment,** such as one or more common
> databases.

Thus, the above passage makes it clear that (1) the persistent store in RICH is a persistent store

of objects, and (2) the objects in the persistent store are maintained by applications in a

computing environment.

For the above reasons, it is clear that the passage in RICH, in col. 21, lines 51-55, means

that any type of persistent store of objects (which may be organized as a file system) may be .

used to implement the remote object replication technique which is claimed as the invention in

RICH. Significantly, and contrary to the assertion in the Office Action, just because the

permanent object store may be organized as a file system, it does NOT necessarily follow that

the invention of RICH supports file system operations. As shown above, the remote object

replication techniques described in RICH pertain to objects and not to any elements of a file

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system, such as, for example, files or folders. Further, the objects in the persistent object store

are accessed and maintained by applications (such as, for example, database servers) and not by

the file system.

Thus, the Applicants respectfully submit that RICH does not describe either explicitly,

implicitly, or inherently, that file system operations are supported.

b. RICH does not describe that file system operations are included in nested

transactions

Simply because a persistent object store may be organized as a file system, it does not

necessarily follow that the operations in the RICH transactions necessarily include file system

operations. In fact, RICH expressly states that the transactions include executing operations

that manipulate objects and NOT operations that may somehow be equivalent to file system

operations.

In col. 7, line 53-59, RICH states:

According to the present invention, the scope of the replication is a transaction.
**What constitutes a transaction is an application-dependent decision. Using
commonly-known industry terms, a transaction represents a logical group
of changes to one or more objects that will be performed in an atomic
manner** (that is, either all operations within the transaction are performed, or
none of them are performed). (Emphasis added.)

Thus, RICH expressly states that "transaction" is defined as a logical group of changes to one or

more objects that will be performed in an atomic manner. Moreover, the above passage makes

it clear that the operations performed in a transaction are operations that change objects and

NOT file system operations as featured in Claims 1 and 10. Furthermore, with respect to nested

transactions, in col. 11, lines 15-20, RICH expressly states that "one or more concurrent and/or

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nested transactions may span one or more nodes of a distributed object system, where the

present invention uses a **nested transaction tree for maintaining the integrity and

consistency of the replicated objects used within the transactions.**" (Emphasis added.)

From the above, it is abundantly clear that any transactions in RICH (whether nested or

not) include operations on OBJECTS and NOT file system operations. Furthermore, given the

fact that RICH does not even mention the term "file system operation", the Applicants do not

consider that RICH even suggests that any of RICH's transactions may include, either implicitly

or inherently, file system operations as recited in Claims 1 and 10.

For the above reasons, since RICH fails to show that one or more file system operations

are performed as part of nested transactions, the Applicants respectfully submit that RICH does

not anticipate Claims 1 and 10 under 35 U.S.C. § 102(e). Reconsideration and withdrawal of

the rejections are respectfully requested.

2. RICH does not describe, either explicitly or implicitly, the feature of

Claims 1 and 10 of receiving a command to perform one or more file

systems operations

The Office Action asserts the feature of Claims 1 and 10 of "receiving a command to

perform one or more file system operations" is described in RICH in col. 7, lines 56-59, col. 17,

lines 51-57, and col. 19, lines 30-33. The Applicants respectfully disagree.

As discussed above, the Applicants respectfully submit that RICH does not describe,

teach, or suggest the performance of file system operations. Furthermore, the passages the

Office Action recites to show the feature of "receiving a command to perform one or more file

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system operations" do not seem relevant to this feature of Claims 1 and 10. Since the Office

Action does not specify what in the above passages corresponds to a command, to one or more

file system operations, or to receiving the command, the Applicants are left to guess as to the

connection between the passages and the above feature of Claims 1 and 10.

In col. 7, line 56-59, RICH states that

a transaction represents a logical group changes to one or more objects that will
be performed in an atomic manner (that is, either all operations within the
transaction are performed, or none of them are performed).

This is simply a definition of what the term transaction means and has nothing to do with

"receiving a command".

In col. 17, lines 51-57, RICH states:

At Block 920, the transaction management system executes a database query (or
other data store retrieval command) in accordance with known techniques to
retrieve the requested object from the database or data store in which it resides.

This passage describes the execution of a database query to retrieve a requested object from the

database or data store in which the object resides. The Applicants fail to see how the execution

of a database query to retrieve an object from a persistent object store may be even remotely

related to "receiving a command to perform one or more file system operations" as recited in

Claims 1 and 10.

Finally, in col. 19, lines 30-33, RICH states:

Block 1305 invokes processing of appropriate database commands to commit
the changes to the database (or other persistent store, using commands
appropriate for that storage facility).

In the above passage, Block 1305 is described with reference to FIG. 13 of RICH. In FIG. 13,

RICH describes the committing of a local child transaction (col. 19, line 18-20.) Further, as can

be seen in FIG. 13, the logic of the depicted flow chart deals with merging the versions of

objects. Specifically, the "appropriate database commands" in Block 1305 are performed if the

local child transaction is a top-level transaction. The Applicants respectfully submit that it is

unclear what, if anything, the committing of a top-level child transaction (as defined in RICH)

has to do with "receiving a command to perform one or more file system operations".

Thus, the Applicants respectfully submit that the above three passages from RICH do

not describe the feature of Claims 1 and 10 of "receiving a command to perform one or more

file system operations."

In page 7, numbered paragraph 18, the Office Action states:

> First, it should be noted that Rich describes a transaction management subsystem
> issuing database operations, i.e. queries, to retrieve objects from a database or
> storage (col. 17 line 51-57). Further, Rich describes a transaction as a "logical
> group of changes to one or more objects that will be performed in an atomic
> manner" (col. 7 lines 56-59). Finally, Rich discusses these transactions being
> performed upon any type of storage medium, including databases, persistent
> storage, or file systems (col. 21 lines 51-55). Thus, Rich clearly discloses
> receiving a command to perform a plurality of file system operations.

The Applicants respectfully submit that the three premises recited by the Office Action do NOT

support the conclusion that "RICH clearly discloses receiving a command to perform a plurality

of file system operations."

First, the Applicants respectfully submit that database queries and file system operations

are NOT equivalent.

Second, the Office Action seems to assert that the database queries to retrieve an object

are performed as a transaction. However, as RICH clearly states in col. 7, lines 56-59, a

transaction represents a logical group of changes to one or more objects. Thus, the Office

Action seems to assert that the changes to one or more objects are performed through database

queries. However, the Applicants cannot find anything in RICH that suggests that the changes

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to objects, which changes are performed by invoking methods of the objects (see RICH, col. 2, lines 4-8), are performed through database queries.

Finally, the fact that a persistent object store may be organized as a file system (as described in col. 21, lines 51-55 of RICH), does not necessarily mean that "logical changes to one or more objects" are inherently made by using file system operations. In fact, the Applicants are not aware of any file system operation that can execute a method, which is associated with an object that is instantiated from an object-oriented class, to effectuate a change to the object. Furthermore, RICH does not describe that an object from a persistent store of objects may be stored as a file in a file system. In fact, RICH is completely silent as to how a persistent object store organized as a file system maintains the objects in the store.

For the above reasons, the Applicants respectfully submit that RICH fails to describe the feature of Claims 1 and 10 of "receiving a command to perform one or more file system operations". Thus, the Applicants respectfully submit that RICH does not anticipate Claims 1 and 10 under 35 U.S.C. § 102(e), and reconsideration and withdrawal of the rejections are respectfully requested.

3. <u>RICH fails to teach performing a first subset of the plurality of operations as part of a first transaction and performing a second subset of the plurality of operations as part of a second transaction that is nested in the first transaction</u>

In the Reply to the previous Office Action, the Applicants argued that the broad citations of whole columns from RICH did not provide the Applicants with adequate notice of

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exactly what in the RICH reference corresponds to or constitutes each element or feature of the claims.

Specifically, with respect to the features of Claims 1 and 10 of "**performing a first subset of said plurality of operations as part of a first transaction**" and "**performing a second subset of said plurality of operations as part of a second transaction that is nested in said first transaction**", the Applicants argued that the large portions of RICH (namely, col. 7, line 53 to col. 8, line 18, and col. 8, line 63 to col. 9, line 40) that the Office Action cited to show the above two features do NOT support the assertion that RICH describes these two features.

However, instead of specifically identifying what in RICH corresponds to each of the features of Claims 1 and 10 of "**performing a first subset of said plurality of operations as part of a first transaction**" and "**performing a second subset of said plurality of operations as part of a second transaction that is nested in said first transaction**", the present Office Action recites the same large portions from RICH without any explanation of how the portions are relevant to these two features.

Furthermore, the present Office Action did NOT respond or in anyway address the Applicants' arguments with respect to these two features.

Thus, for the reasons stated in the Reply to the previous Office Action the Applicants respectfully submit that the features of Claims 1 and 10 of "**performing a first subset of said plurality of operations as part of a first transaction**" and "**performing a second subset of said plurality of operations as part of a second transaction that is nested in said first transaction**", are not taught, suggested, or described in col. 7, line 53 to col. 8, line 18, and col.

8, line 63 to col. 9, line 40, of RICH. Thus, reconsideration and withdrawal of the rejection of

Claims 1 and 10 under 35 U.S.C. § 102(e) over RICH is respectfully requested.

B.   CLAIMS 2-9 AND 11-18

Claims 2-9 and 11-18 have been rejected under 35 U.S.C. § 102(e) as allegedly

anticipated by RICH.

Each of Claims 2-9 and 11-18 is dependent upon one of independent Claims 1 and 10,

and thus includes each and every feature of its corresponding independent claim. Each of

Claims 2-9 and 11-18 is therefore allowable for the reasons given above for Claims 1 and 10.

In addition, each of Claims 2-9 and 11-18 introduces one or more additional features

that independently render it patentable.

However, in rejecting Claims 2-9 and 11-18, the Office Action provides broad citations

of whole columns in RICH and does not specify exactly what in the RICH reference

corresponds to or constitutes each feature of the claims. In an Office Action "the particular part

relied on must be designated as nearly as practicable ... The pertinence of each reference, if not

apparent, must be clearly explained ..." (MPEP §707, citing 37 C.F.R. §1.104(c)(2)), and "the

particular figure(s) of the drawings(s), and/or page(s) or paragraph(s) of the reference(s), and/or

any relevant comments briefly stated should be included." (MPEP §707). The present citations

to RICH do not provide the Applicants with adequate notice or reasonable particularity with

respect to the basis of the rejections. Instead, large portions of RICH are simply identified in a

non-specific way. As a result, the Applicants have had to engage in guesswork to determine the

basis of the rejections.

Since the Applicants cannot determine the relevance of the large portions from RICH

cited to reject Claims 2-9 and 11-18, the Applicants respectfully request that any subsequent

Office Action identifies with the reasonable particularity required by MPEP §707 the elements

from RICH that constitute each of the features of Claims 2-9 and 11-18. Because of this, and

due to the fundamental differences already identified, to expedite the positive resolution of this

case a separate discussion of those features is not included at this time.

Therefore, it is respectfully submitted that Claims 2-9 and 11-18 are allowable for the

reasons given above with respect to Claims 1 and 10. For this reason, reconsideration and

withdrawal of the rejections of Claims 2-9 and 11-18 under 35 U.S.C. § 102(e) are respectfully

requested.

III.   CONCLUSION

The Applicants believe that all issues raised in the Office Action have been addressed.

Further, for the reasons set forth above, the Applicants respectfully submit that allowance of the

pending claims is appropriate. Reconsideration of the present application is respectfully

requested in light of the amendments and remarks herein.
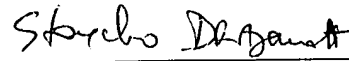
The Examiner is respectfully requested to contact the undersigned by telephone if it is

believed that such contact would further the examination of the present application.

To the extent necessary to make this reply timely filed, the Applicant petitions for an

extension of time under 37 C.F.R. § 1.136. If any applicable fee is missing or insufficient,

throughout the pendency of this application, the Commissioner is hereby authorized to charge

any applicable fees and to credit any overpayments to our Deposit Account No. 50-1302.

Respectfully submitted,

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Dated: June 2, 2005

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